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and  
heating the substrate and oxide mixture layer thereon to a temperature of from about 900 to 1100°C for [all] at least about 5 minutes; and

quenching the substrate and oxide mixture layer thereon to ambient temperature in air.

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REMARKS

On December 2, 1987 at the Examiner's suggestion, an interview was held. At that time this Application and the two applications from which this Application was continued-in-part, Serial Nos. 2,089 and 6,991, had received Office Actions. At the time of the interview, the Examiner indicated that a Supplemental Office Action would be issued in this Application to cite additional references. Applicant's counsel indicated that a Preliminary Amendment would be filed in Application Serial No. 32,041 which would consolidate in that application various claims originally set forth in Serial Nos. 2,089; 6,991; and this Application Serial No. 12,205; that following such Preliminary Amendment in Serial No. 32,041 that Application Serial Nos. 2,089 and 6,991 would be abandoned and that the claims in this Application Serial No. 12,205 would, following receipt of the Supplemental Office Action to be issued, be amended in light of the claims added by Preliminary Amendment to Serial No. 32,041.

Following the December 2, 1987 interview, the referred to Preliminary Amendment for Application Serial No. 32,041 was filed on December 4, 1987. Thereafter on January 20, 1988 an Office Action was issued in Serial

No. 32,041 and an Amendment responsive thereto was filed in Serial No. 32,041 on February 16, 1988.

In view of claims 78-81 and 88-89, and 91 added to Serial No. 32,041 by Preliminary Amendment, which claims have since been amended in light of the January 20, 1988 Office Action in Serial No. 32,041, claims 1-8 in this Application are being cancelled without prejudice.

In Serial No. 32,041 claim 88 as presented substantially includes claim 1 of this Application Serial No. 12,205, differing only with respect to a broader value of "x" and slightly different stated temperatures. Likewise in Serial No. 32,041 claims 89 and 91 are similar to claims 2 and 4 of this Application Serial No. 12,205. The pressure feature recited by claim 3 of this Application is similar to that of claim 91 in Serial No. 32,041. In view thereof claims 1-4 of this Application are hereby cancelled without prejudice since claims similar thereto are now pending in Serial No. 32,041.

In Serial No. 32,041, claims 78-81 added by Preliminary Amendment are substantially identical to claims 5-8 of this Application. In view thereof claims 5-8 of this Application are being cancelled without prejudice.

Claims 9-12 remain pending in this application.

Claims 9-11 are to a superconducting oxide structure wherein a metal oxide of formula  $(L_{1-x}M_x)_aA_bO_y$ , where  $x = 0.1$  to  $0.5$ ;  $a$  is  $1$  to  $2$ ;  $b$  is  $1$ ; and  $y$  is  $2$  to  $4$ , is deposited on a copper substrate (claim 9); the structure comprises a first, second and third layered phase of oxide

complex (claim 10); and the layered oxide complex structure is of the oxide composition  $(Y_{1-x}Ba_x)_aCu_bO_y$  (Claim 11).

Claim 12 is to a method for making superconducting metal oxide complex comprising mixing solid compounds of L, M, A and O to yield the formula  $(L_{1-x}M_x)_aA_bO_y$ ; depositing the mixture on to a copper substrate; heating the substrate and oxide mixture layer thereon to 900-1100°C for at least five minutes; and quenching the substrate and oxide mixture layer thereon to ambient temperature in air.

Support for structure claims 9-11 and method claim 12 is found at p.8, line 31 through p. 9, line 8 of this Application.

No rejection of claims 9-12 has been made on the basis of prior art. Instead, the only rejection of claims 9-12 are based upon 35 U.S.C. § 112 as (a) based upon an inadequate specification to support the breath of the claims, see paragraphs 1 and 2 of Paper No. 6; (b) based upon an inadequate specification to teach how to make and use and the best mode for practice of the subject matter of claim 9-12, see paragraphs 3 and 4 of Paper No. 6; (c) being indefinite with respect to the terms "glossy insulating phase" and "third insulator phase", see paragraph 5 of Paper No. 6; and (d) not being enabling or distinct with regards to the formula value "Y" when it is 2 or 3, see paragraph 3 of Paper No. 9.

Applicant respectfully traverses all such objections and rejections for the reasons which follow and request

reconsideration and withdrawal of such objections and rejections.

Independent claims 9 and 12 have been amended to limit the defined "M" element to barium, strontium or a combination thereof and the "A" element to copper. By so amending applicant does not concede that the specification fails to provide an enabling disclosure relative to the making or use of superconductive oxide compositions wherein "M" is solely Ca, Mg or Hg and when "A" is an identified element other than Cu. Nor does applicant agree with the Examiner's position that the absence of a specific example illustrating superconductive oxide compositions wherein "M" is solely Ca, Mg or Hg and "A" is other than Cu renders the written specification non-enabling under 35 U.S.C. § 112. As Applicant's counsel views the objection/rejection, it is not the lack of a written disclosure which is questioned but instead the operability of species within the written disclosure which are not exemplified by specific examples. Applicant's counsel believes the proper basis for rejection based on doubts by the Examiner about the operability of non-exemplified species of the disclosure to be more accurately based on 35 U.S.C. § 101. However, based on comments during the December 2, 1987 interview and a reading of the cases cited by the Examiner in support of the objection and rejection, Applicant's counsel understands the stated objection/rejections to be one that can be removed by submitting evidence in declaration form adequate to satisfy the Examiner that such other species are operative. Hence, the difference

as to whether the objection/rejection is properly based on 35 U.S.C. § 112 or instead on 35 U.S.C. § 101 is a difference as to form rather than substance.

At this time Applicant chooses to answer the objection/rejection by limiting amendments to claims 9-12 rather than to present extrinsic evidence of operability of the other species. Such amendments as noted are believed to fully answer and overcome the objection and rejections stated in paragraphs 1 and 2 of Paper No. 6.

As regards the 35 U.S.C. § 112, first paragraph objection/rejection as stated at paragraphs 3 and 4 of Paper No. 6, it is respectfully submitted that there is no legal authority for the proposition that the absence of a specific example equates to a failure to disclose a best mode. Instead, it is well established that examples are not necessary and the absence of a working example is without significance. Ex parte Nardi and Simier, 229 U.S.P.Q. 79, 80 (P.T.O. Bd. Pat. App. & Int'f 1986). See also In re Gay, 135 U.S.P.Q. 311, 316 (C.C.P.A. 1962), In re Stephens, Benvau, and Benvau, 188 U.S.P.Q. 659, 661 (C.C.P.A. 1976).

The Examiner's attention is directed to page 8, line 31 through page 9, line 18 of the application as fully and adequately describing the process for preparing the superconducting oxide structure as claimed in claims 9-11 and of the method as claimed in claim 12. Given the description therein, one of ordinary skill in the art would not have to engage in undue experimentation to practice the described process. The method is described generally as mixing L, M, A and O solid powdered compounds

in appropriate amounts to provide the  $(L_{1-x}M_x)_aA_bO_y$  formula, depositing the mixture on a copper substrate, compressing the mixture to a layer on the copper substrate, heating the substrate-layer mixture, then quenching it in air. The general step of mixing is fully described at page 7, line 26 through page 8, line 30 as carried out in an intensive mixer such as a ball mill. The type of substrate upon which such mixture is to be deposited is adequately described as copper which has been cleaned of its oxide surface film, preferably by acid cleaning in dilute HCl. One of ordinary skill would have no difficulty in knowing how to place such powdered mixture on a copper substrate. Next such powder mixture as is deposited on the copper substrate is compressed against the substrate at the specified pressure range to form the powdered mixture into a layer on the substrate. The compressed powdered layer on substrate is then heated in air at the temperatures and times described. Those of ordinary skill could readily follow the described procedure. Last, the heated substrate-layer is quenched to room temperature in air. Again, it is not seen how one of ordinary skill would have any difficulty in following the described procedure. The Examiner has not offered any explanation as to why or how it is believed that undue experimentation would be required to practice the procedure as described.

The Examiner's statement that it is unpredictable as which substrates would be suitable is not understood in light of the fact that the specification and claims describe the substrate to be used as copper cleaned of its

copper oxide film. The specification specifically discloses such copper as a suitable substrate and claims 9-12 are so limited.

Further, the Examiner has questioned the suitability of the claimed substrate copper unless it has a protective coating thereon and as support referred to the Jin article of record. Two points should be noted, first, Jin, a May 22, 1987 publication which is post date of this Application, speaks to composite wire fabrication and alludes to an as of then unpublished manuscript by Jin et al, footnote 7, concerning an investigation of suitable metals as a diffusion barrier or substrate for contact with "the Ba-Y cuprate" (i.e.  $\text{Ba}_2\text{YCuO}_7$ ). There is no statement in Jin that copper absent "a protective coating thereon" may be unsuitable as the Examiner concludes. That Jin fabricated clad wire samples of  $\text{Ba}_2\text{YCuO}_7$  superconductor using a copper cladding having a Ni/Au diffusion barrier does not establish that copper without such diffusion barrier is unsuitable as a substrate for the purpose described by this Application. The present Application specifically describes copper cleaned of its copper oxide film as a suitable substrate material. That the Examiner may speculate from the Jin article that copper having a Ni/Au diffusion barrier may be an even better substrate for the purpose does not provide adequate reasons to object to the specification or reject claims on a supposed theory that copper absent such diffusion barrier coating is not a suitable substrate.

Second, the Examiner should note that the cleaned copper substrate is a starting material but the structure

resulting from the process as described is one wherein a "glassy insulating layer phase" is formed adjacent the copper substrate. As described, this layer is an insulating layer and it may, within the context of the structure formed, serve the same or similar purpose as the diffusion layer mentioned by Jin, or such layer may form because the copper substrate as used initially lacks a diffusion barrier of the Jin type. In any event the application describes the formed structure as comprising three phases, the second of which is the superconducting layer phase. There is nothing in the Jin article that would cast reasonable doubt upon the disclosure statement that such second phase layer is formed by the process described or that it is a superconducting layer.

In view of the above remarks, the Examiner is requested to reconsider the objections/rejections as set forth at paragraphs 3 and 4 of Paper No. 6 and to withdraw same.

In Paper No. 6, paragraph 5, claims 10 and 11 were rejected under 35 U.S.C. § 112, second paragraph as indefinite for failing to identify "the composition and nature of the 'glossy (sic - glassy) insulating phase' and the 'third' insulator phase." In part response thereto, the dependency of claims 10 and 11 have been amended to make claim 11 dependent on claim 9 and claim 10 to be dependent on claim 11. Hence it is believed that as amended only claim 10 is still subject to the rejection. In so far as claim 10 as amended is still subject to rejection, the rejection is traversed and reconsideration is requested.



The electrical nature of each recited phase of the structure claimed by claim 10 is identified. The second phase is described as the superconducting phase whereas the first and third phases are described as an insulator. What else about the nature of the phases must be described for purposes of compliance with 35 U.S.C. § 112, second paragraph? The empirical formula for the composition of each phase is not described, nor was it known at the time of filing. What is described and claimed, by reason of the dependency of claim 10 on claim 9, is that the superconducting metal oxide structure comprising said first, second and third layered phases has the formula  $(L_{1-x}M_x)_aA_bO_y$ . Further, a compositional description was not known at the time of filing, hence the three phase layer structure and the nature of each was described and claimed. It is believed that claim 10 is definite for purposes of describing that which applicant regards as the invention, namely a metal oxide structure of formula  $(L_{1-x}M_x)_aA_bO_y$  deposited on a copper substrate in the form of three discernable phases with that phase adjacent the copper substrate being an insulator, the next phase being a superconductor and the third phase being an insulator. One of the ordinary skill using an oxide complex of formula  $(L_{1-x}M_x)_aA_bO_y$  deposited on a copper substrate would, it is believed, be able to determine whether such article meets the limitations of claim 10 by examining the article for the three phase structure as specified in the claim. Under the circumstances, 35 U.S.C. § 112, second paragraph, cannot and does not require greater

particularity or distinction. Withdrawal of this basis for rejection is requested.

The above remarks have addressed all grounds for objection/rejection under 35 U.S.C. § 112 as set forth in Paper No. 6. In the Supplemental Office Action of February 2, 1988 (Paper No. 9) an additional 35 U.S.C. § 112, first and second paragraphs rejection involving claims 9-12 was stated. The claims were stated to be inoperative broad when "y" of the formula  $(L_{1-x}M_x)_aA_bO_y$  is two or three, and the Examiner directed attention to the Ryne et al article.

The Ryne et al article, which post dates the filing date of this application, describes neutron scattering measurements made on  $YBa_2CuO_{6-7}$  material to determine oxygen site occupation. The Ryne articles notes that no superconductivity transition was found in a  $YBa_2CuO_{6.05}$  material and that superconduction was observed only for a  $YBa_2CuO_{6.95}$  material.

With regards to claims 9-12, the Examiner should note that for the "x" values of the  $(L_{1-x}M_x)_aA_bO_y$  formula it is not possible to obtain a pure  $YBaCu_3O_{6-7}$  material as was the subject of discussion in the Ryne et al article. It is, of course, known that an oxide formulated to a nominal composition  $Y_{1.2}Ba_{0.8}CuO_y$  (i.e.  $x = 0.4$ ,  $a = 2$ ,  $y = 2-4$ ) yields a mixed phase oxide one phase of which is a  $Y_1Ba_2Cu_3O_{6+\delta}$  ( $\delta = 0.1$  to  $1.0$ ) composition. So it is clear that claims 9-12 do read upon a superconducting oxide structure which contains as a phase the  $YBaCu_3O_7$  composition as described by the Ryne et al article.

However, in view of claim 10, it is also clear that the claimed superconducting oxide structure may and will contain other phases of a composition different from  $\text{YBa}_2\text{CuO}_7$  which are not superconducting but instead are insulating.

The nominal formula descriptive of the oxide structure as a whole is properly given as  $(\text{L}_{1-x}\text{M}_x)_a\text{A}_b\text{O}_y$  wherein "y" is from about 2 to about 4. The claimed oxide structure is prepared by heating in air following which the structure is quenched to room temperature in air. No special heating or quenching procedure for purposes of specifically controlling the oxygen content to a predetermined value is described or required. Wherein the "y" range of 2 to 4 the actual total oxygen content of the described and claimed oxide structure precisely falls was not known at the time of filing. What was known was that the oxygen content was between 2 to 4 and the structure described exhibited superconduction.

The description does disclose to one of ordinary skill in the art how to make and use the claimed superconducting oxide structure. As before noted, the claimed structure is made by heating and quenching in air there being no necessity to employ special procedures to control oxygen content to a level different than that naturally obtained by the described heating and quenching steps. Hence the "y" value does not of itself instruct one how to obtain operative species other than to specify the requirement that the total oxygen content of the structure will be between 2 to 4.

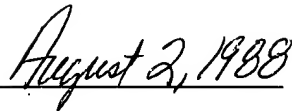
In view of the above remarks it is believed that the objections/rejections based on 35 U.S.C. § 112 should be withdrawn.

Respectfully submitted,



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CERTIFICATE UNDER 37 CFR 1.8(a)

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231, on August 2, 1988, 1988.



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